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P3.11: Cathode Manufacturing Globalization and Its Effects on Instability in the Metals Markets on Cathode Pricing

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Introduction:

Several years ago, members of a select group of Cathode Manufacturers and VED Tube Manufacturers were brought together under a Title III project with the mission of creating assured, affordable, commercially viable production capabilities and capacities for dispenser cathodes. At some point during one of the joint meetings Mr. Robert Johnson from the Air Force Research Laboratory, Wright Patterson Air Force Base, a representative of the Department of Defense basically and rather eloquently re-stated the mission for the group. In simple terms, he stated, the Department of Defense would like to be in the enviable position of being able purchase as many systems as they possible could; however, the single caveat was that "We as a group, need to take into account that the Department of Defense had a fixed budget. In other words, if we could contain or reduce costs, or improve the longevity of systems, then more systems could and would be purchased in the future.

Section One: Today's Reality

While the economic reality under which the working groups worked during the Title III program was somewhat realized through better understand and control of processing parameters which did resulted in reduction of both planned yields and scrap losses, today's economic reality is that the old cost drivers such as labor, planned yield losses and scrap have taken a back seat to the cost of materials. In today's global economy, industry is competing for scarce resources to the point that where many of the materials used to see only predicable inflationary increase year to year, today see increases happen day to day. A good portion of this volatility can be attributed to economic globalization and the rapid increase in industrialization in Asia and developing nations. This increase has and is having a dramatic effect on the demand side of the supply. The demand curves are creating the volatility in the materials markets, and are having an particularly dramatic effect on the materials used in the manufacture of vacuum electron devices.

Section Two: Supply Side

National Interests: It is reported that China holds approximately 30 % of the worlds known reserve of Molybdenum. Domestic demand within China is expected to out strip its internal supply sometime between 2010 and 2011, and it is expected the internal demand for this alloy will continued growth.

In recent years China has closed some 300+ Moly mines dues to environmental issues under pressure from the World Trade Organization, further reducing supply.

It is reported by at least on~ source: China has considered listing Moly a~ a Strategic Alloy and should this action be taken it would further reduce an already diminished supply.

Reports suggest that 12.5 to 20% increases on Moly pricing per year can be expected for at least the 3 to 5 years.

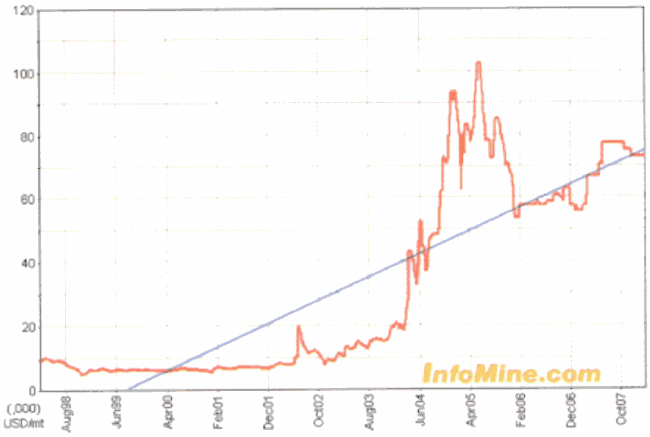

Figure 1: Moly Pricing Chart (August 1998-October 2007)

Rhenium

Rhenium is easily the rarest of all the refractory materials, 120 tons of copper ore typically yields only 1 gram of this material. It like Moly has seen significant spikes in demand for industrialization and aerospace uses and the chart below shows how this demand has affected pricing.

It is worthy of note that the single largest use for Rhenium and its alloys is the aerospace industry and in reaction to the anticipated potential that Rhenium prices could reach as much as $10,000.00 per pound General Electric Jet Engine Company has initiated activities to develop a new

super alloy for use in jet engines, without the use of Rhenium.

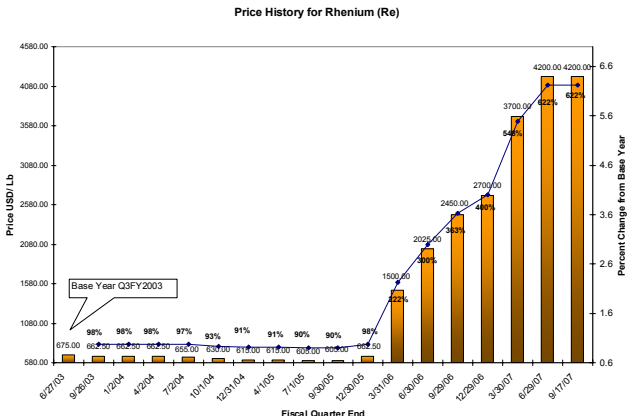

Figure Two: Rhenium Pricing Chart May 2003 – September 2007

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Tungsten

While tungsten supply and pricing have been relatively stable over the past couple of years, demand has continued to rise. It is reported that demand and market pressures are expected to cause an increase in pricing in as early as mid 2007 and not later than mid 2008.

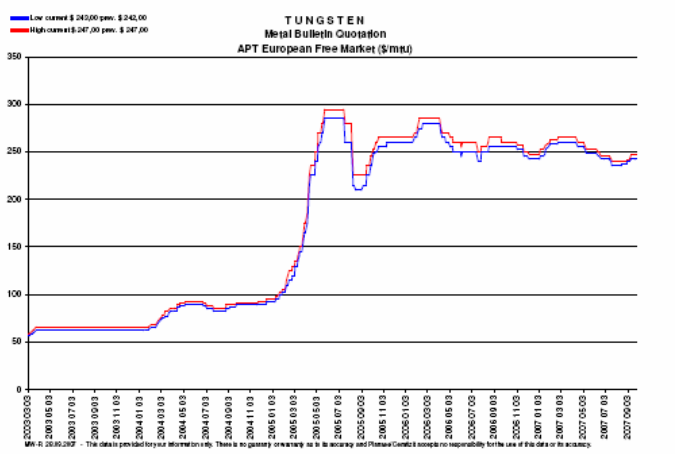

Figure 3: Tungsten Pricing Chart (March 2003-September 2007)

Section 4: Conclusion

As the global economies continue to grow further pricing pressures for the materials used in the manufactures of Vacuum Electron Devices will not abate. The intent of this is not to address the potential for significant material shortages, but to start a dialog within the industry on how to deal with these pending issues.